

WHAT IS CLAIMED IS

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1. A sheet punch device for punching a sheet with a punch edge, comprising:

a motor performing a punching operation;

10 a position detection unit detecting a position of the punch edge; and

a control unit controlling the motor and the position detection unit, wherein the control unit causes the position detection unit to detect a position of the punch edge at a time of or prior to a motor stop in a first driving operation of the motor to perform the punching operation, and, when the detected position deviates from a desired position, the control unit performs restarting of the motor so that the punch edge is brought close to the desired position.

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2. A sheet punch device for punching a sheet with a punch edge, comprising:

a motor performing a punching operation;

25 a position detection unit detecting a position of the

punch edge; and

a control unit controlling the motor and the position detection unit, wherein the control unit causes the position detection unit to detect a position of the punch edge at a time of or prior to a motor stop in a first driving operation of the motor to perform the punching operation, and, when the detected position deviates from a desired position, the control unit changes a motor-drive amount to restart the motor, in accordance with an amount of the deviation of the detected position from the desired position.

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3. The sheet punch device according to claim 1 wherein the control unit is provided to cause the position detection unit to detect a position of the punch edge when a predetermined time has elapsed after a start of the first driving operation of the motor, so that the control unit determines an amount of the deviation of the detected position from the desired position and performs the restarting of the motor based on the amount of the deviation.

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4. The sheet punch device according to claim 3 wherein

the control unit is provided to set the predetermined time such that the predetermined time passes before the time of the motor stop, and set an amount of the deviation of the punch edge position to a position preceding an original stop position in a motor rotation direction.

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5. The sheet punch device according to claim 1 wherein the control unit is provided to start conveyance of the punched sheet prior to the motor stop in the first driving operation of the motor.

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6. The sheet punch device according to claim 5 further comprising a home-position detection unit detecting that the punch edge is evacuated from a sheet transport edge, wherein the control unit is provided to start conveyance of the sheet prior to the motor stop in the first driving operation of the motor and after the punch edge is detected as being evacuated from the sheet transport edge by the home-position detection unit.

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7. The sheet punch device according to claim 1 wherein the position detection unit comprises a home-position detection unit detecting that the punch edge is evacuated from a sheet transport edge, and a motor-drive amount detection unit, and the control unit is provided to determine a position of the punch edge based on an amount of driving of the motor detected by the motor-drive amount detection unit starting from a time the punch edge is detected as being evacuated from the sheet transport edge by the home-position detection unit after a start of the first driving operation of the motor.

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8. The sheet punch device according to claim 7 further comprising a timer unit detecting that a predetermined time has elapsed during the driving of the motor, wherein the motor-drive amount detection unit detects an amount of driving of the motor at an end of the predetermined time, and the control unit is provided to change a starting position of a motor stop operation in the first driving operation of the motor, based on an amount of driving of the motor detected by the motor-drive amount detection unit.

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9. The sheet punch device according to claim 7 wherein
the motor-drive amount detection unit detects a motor stop position
in a first driving operation of the motor to perform an initial
operation and the punching operation, and the control unit is
5 provided to change a motor stop operation in a subsequent driving
operation of the motor, based on the motor stop position detected by
the motor-drive amount detection unit.

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10. The sheet punch device according to claim 1 wherein
the motor is a DC brush motor, and the control unit is provided to
perform a motor stop operation by short-circuiting the DC brush
15 motor.

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11. The sheet punch device according to claim 1 wherein
the motor is a DC brush motor, and the control unit is provided to
perform a motor stop operation by using both reverse braking and
short-circuiting of the DC brush motor.

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12. The sheet punch device according to claim 11
wherein the control unit is provided to perform the motor stop
operation by using both reverse braking and short-circuiting of the
motor at the time of the motor stop in the first driving operation of
5 the motor to perform the punching operation.

10 13. The sheet punch device according to claim 12
wherein the control unit is provided to change a braking time of a
reverse braking operation during the first driving operation of the
motor to perform the punching operation, based on an amount of
driving of the motor detected by a motor-drive amount detection unit
15 at an end of a predetermined time after a start of the first driving
operation of the motor.

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14. The sheet punch device according to claim 13
wherein the motor-drive amount detection unit detects the amount of
driving of the motor at the end of the predetermined time prior to a
start of the reverse braking operation.

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15. The sheet punch device according to claim 13
wherein the control unit is provided to perform the detection of the
motor-drive amount and the reverse braking operation at a plurality
of times.

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16. The sheet punch device according to claim 13
wherein the control unit is provided not to perform the reverse
braking operation when the detected motor-drive amount is smaller
than a predetermined amount.

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17. A sheet processing device in which a sheet punch
device for punching a sheet with a punch edge is provided,
comprising a sheet processing unit receiving the sheet, performing
post-processing of the sheet including a punching operation on the
sheet, and ejecting the punched sheet,

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the sheet punch device comprising:

a motor performing the punching operation;

a position detection unit detecting a position of the

25 punch edge; and

a control unit controlling the motor and the position
detection unit, wherein the control unit causes the position detection
unit to detect a position of the punch edge at a time of or prior to a
motor stop in a first driving operation of the motor to perform the
5 punching operation, and, when the detected position deviates from a
desired position, the control unit performs restarting of the motor so
that the punch edge is brought close to the desired position.

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18. An image forming system in which a sheet
processing device and an image forming device are provided
integrally or separately, the sheet processing device comprising:
15 a sheet punch device punching a sheet with a punch
edge; and
a sheet processing unit receiving the sheet, performing
post-processing of the sheet including a punching operation, and
ejecting the punched sheet,
20 the sheet punch device comprising:
a motor performing the punching operation;
a position detection unit detecting a position of the
punch edge; and
a control unit controlling the motor and the position
25 detection unit, wherein the control unit causes the position detection

unit to detect a position of the punch edge at a time of or prior to a motor stop in a first driving operation of the motor to perform the punching operation, and, when the detected position deviates from a desired position, the control unit performs restarting of the motor so
5 that the punch edge is brought close to the desired position.

10 19. A computer program product embodied therein for causing a computer to execute a method of controlling a sheet punch device for punching a sheet with a punch edge, the sheet punch device including a motor performing a punching operation, and a position detection unit detecting a position of the punch edge, the
15 method comprising steps of:

causing the position detection unit to detect a position of the punch edge at a time of or prior to a motor stop in a first driving operation of the motor to perform the punching operation;
and

20 performing, when the detected position deviates from a desired position, restarting of the motor so that the punch edge is brought close to the desired position.

20. A computer program product embodied therein for causing a computer to execute a method of controlling a sheet punch device for punching a sheet with a punch edge, the sheet punch device including a motor performing a punching operation, and a position detection unit detecting a position of the punch edge, the method comprising steps of:

causing the position detection unit to detect a position of the punch edge at a time of or prior to a motor stop in a first driving operation of the motor to perform the punching operation; and

changing, when the detected position deviates from a desired position, a motor-drive amount to restart the motor, in accordance with an amount of the deviation of the detected position from the desired position.

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21. A sheet punch device for punching a sheet delivered from an external device, comprising:

a motor performing a punching operation on the sheet;
a motor-drive amount detection unit detecting an amount of driving of the motor;

a timer unit detecting that a predetermined standard time has elapsed during the driving of the motor; and

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a control unit causing the motor drive amount detection unit to detect a motor-drive amount of the motor during the punching operation at a time the standard time has elapsed, and the control unit changing a starting position of a motor stop operation in accordance with the detected motor-drive amount.

22. The sheet punch device according to claim 21 wherein the timer unit is provided to detect that the predetermined standard time has elapsed after a start of the motor driving.

23. A sheet punch device provided in a sheet processing device for punching a sheet received at the sheet processing device, the sheet processing device performing post-processing of the sheet, the sheet punch device comprising:

- a motor performing a punching operation on the sheet;
- a motor-drive amount detection unit detecting an amount of driving of the motor;
- a home-position detection unit detecting a home position of a punch edge; and

a control unit causing the motor-drive amount detection unit and the home-position detection unit to detect a motor stop position when a punching operation including an initial operation is performed by the motor, and the control unit changing a motor stop operation when a subsequent punching operation is performed by the motor at a time following the initial operation, in accordance with the detected motor stop position during the initial operation.

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24. The sheet punch device according to claim 23 wherein the control unit is provided to cause the motor-drive amount detection unit and the home-position detection unit to detect a motor stop position when the initial operation is performed, and the control unit changing the motor stop operation when a subsequent punching operation is performed at a time following the initial operation, in accordance with the detected motor stop position during the initial operation.

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25. The sheet punch device according to claim 23 wherein the control unit is provided to cause the motor-drive amount

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detection unit and the home-position detection unit to detect a motor stop position when the punching operation including the initial operation is performed, and the control unit changing the motor stop operation when a subsequent punching operation is performed, in accordance with the detected motor stop position during the previous punching operation.

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26. The sheet punch device according to claim 23 wherein the control unit is provided to cause the motor-drive amount detection unit and the home-position detection unit to detect a motor stop position when the punching operation including the initial operation is performed, and the control unit changing the motor stop operation when a subsequent punching operation is performed, in accordance with a set of motor stop positions detected during previous punching operations.

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27. The sheet punch device according to claim 25 wherein, when the punching operation is performed continuously, the control unit is provided to perform a punching operation without

sheet, before a first sheet for an arbitrary job is received, so that a motor stop position is detected, and the control unit changing a motor stop operation in a punching operation of the first sheet in accordance with the detected motor stop position.

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28. The sheet punch device according to claim 23
10 wherein the motor is a DC brush motor, and the motor stop operation is performed by short-circuiting the DC brush motor.

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29. The sheet punch device according to claim 23
wherein the motor is a DC brush motor, and the motor stop operation is performed by using reverse braking and short-circuiting of the DC brush motor.

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30. A sheet processing device in which a sheet punch
25 device for punching a sheet is provided, the sheet processing device

receiving the sheet and performing post-processing of the sheet, the sheet punch device comprising:

a motor performing a punching operation on the sheet;

5 a motor-drive amount detection unit detecting an amount of driving of the motor;

a home-position detection unit detecting a home position of a punch edge; and

a control unit causing the motor-drive amount detection unit and the home-position detection unit to detect a motor stop position when a punching operation including an initial operation is performed by the motor, and the control unit changing a motor stop operation when a subsequent punching operation is performed by the motor at a time following the initial operation, in accordance with the detected motor stop position during the initial operation.

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31. An image forming system in which a sheet processing device and an image forming device are provided, the sheet processing device including a sheet punch device for punching a sheet, the sheet processing device receiving the sheet and performing post-processing of the sheet, the sheet punch device comprising:

25 a motor performing a punching operation on the sheet;

a motor-drive amount detection unit detecting an amount of driving of the motor;

a home-position detection unit detecting a home position of a punch edge; and

5 a control unit causing the motor-drive amount detection unit and the home-position detection unit to detect a motor stop position when a punching operation including an initial operation is performed by the motor, and the control unit changing a motor stop operation when a subsequent punching operation is performed by the
10 motor at a time following the initial operation, in accordance with the detected motor stop position during the initial operation.

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32. A sheet punch device for punching a sheet with a punch edge, comprising:

motor means for performing a punching operation;

position detection means for detecting a position of the

20 punch edge; and

control means for controlling the motor means and the position detection means, wherein the control means causes the position detection means to detect a position of the punch edge at a time of or prior to a motor stop in a first driving operation of the
25 motor means to perform the punching operation, and, when the

detected position deviates from a desired position, the control means performs restarting of the motor means so that the punch edge is brought close to the desired position.

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33. A sheet punch device for punching a sheet with a punch edge, comprising:

10 motor means for performing a punching operation;
 position detection means for detecting a position of the punch edge; and

 control means for controlling the motor means and the position detection means, wherein the control means causes the
15 position detection means to detect a position of the punch edge at a time of or prior to a motor stop in a first driving operation of the motor means to perform the punching operation, and, when the detected position deviates from a desired position, the control means changes a motor-drive amount to restart the motor means, in
20 accordance with an amount of the deviation of the detected position from the desired position.

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34. A sheet processing device in which a sheet punch
device for punching a sheet with a punch edge is provided,
comprising a sheet processing unit receiving the sheet, performing
post-processing of the sheet including a punching operation on the
5 sheet, and ejecting the punched sheet,

the sheet punch device comprising:

motor means for performing the punching operation;

position detection means for detecting a position of the
punch edge; and

10 control means for controlling the motor means and the
position detection means, wherein the control means causes the
position detection means to detect a position of the punch edge at a
time of or prior to a motor stop in a first driving operation of the
motor means to perform the punching operation, and, when the
15 detected position deviates from a desired position, the control means
performs restarting of the motor means so that the punch edge is
brought close to the desired position.

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35. An image forming system in which a sheet
processing device and an image forming device are provided
integrally or separately, the sheet processing device comprising:

25 a sheet punch device punching a sheet with a punch

edge; and

a sheet processing unit receiving the sheet, performing post-processing of the sheet including a punching operation, and ejecting the punched sheet,

5 the sheet punch device comprising:

motor means for performing the punching operation;

position detection means for detecting a position of the punch edge; and

control means for controlling the motor means and the
10 position detection means, wherein the control means causes the position detection means to detect a position of the punch edge at a time of or prior to a motor stop in a first driving operation of the motor means to perform the punching operation, and, when the detected position deviates from a desired position, the control means
15 performs restarting of the motor means so that the punch edge is brought close to the desired position.

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36. A sheet punch device for punching a sheet delivered from an external device, comprising:

motor means for performing a punching operation on the sheet;

25 motor-drive amount detection means for detecting an

amount of driving of the motor means;

timer means for detecting that a predetermined standard time has elapsed during the driving of the motor means; and

control means for causing the motor drive amount

5 detection means to detect a motor-drive amount of the motor means during the punching operation at a time the standard time has elapsed, and the control means changing a starting position of a motor stop operation in accordance with the detected motor-drive amount.

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37. A sheet punch device provided in a sheet processing
15 device for punching a sheet received at the sheet processing device, the sheet processing device performing post-processing of the sheet, the sheet punch device comprising:

motor means for performing a punching operation on the sheet;

20 motor-drive amount detection means for detecting an amount of driving of the motor means;

home-position detection means for detecting a home position of a punch edge; and

control means for causing the motor-drive amount
25 detection means and the home-position detection means to detect a

motor stop position when a punching operation including an initial operation is performed by the motor means, and the control means changing a motor stop operation when a subsequent punching operation is performed by the motor means at a time following the initial operation, in accordance with the detected motor stop position during the initial operation.

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38. A sheet processing device in which a sheet punch device for punching a sheet is provided, the sheet processing device receiving the sheet and performing post-processing of the sheet, the sheet punch device comprising:

15 motor means for performing a punching operation on the sheet;

 motor-drive amount detection means for detecting an amount of driving of the motor means;

 home-position detection means for detecting a home position of a punch edge; and

20 control means for causing the motor-drive amount detection means and the home-position detection means to detect a motor stop position when a punching operation including an initial operation is performed by the motor means, and the control means
25 changing a motor stop operation when a subsequent punching

operation is performed by the motor means at a time following the initial operation, in accordance with the detected motor stop position during the initial operation.

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39. An image forming system in which a sheet processing device and an image forming device are provided, the sheet processing device including a sheet punch device for punching a sheet, the sheet processing device receiving the sheet and performing post-processing of the sheet, the sheet punch device comprising:

motor means for performing a punching operation on the sheet;

motor-drive amount detection means for detecting an amount of driving of the motor means;

home-position detection means for detecting a home position of a punch edge; and

control means for causing the motor-drive amount detection means and the home-position detection means to detect a motor stop position when a punching operation including an initial operation is performed by the motor means, and the control means changing a motor stop operation when a subsequent punching operation is performed by the motor means at a time following the

initial operation, in accordance with the detected motor stop position during the initial operation.

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